

Sec 3

عبدی عبد الغفار — سلام

Q: $x_1(n) = 5 \delta(n) - 2 \delta(n-2)$
 $x_2(n) = 3 \delta(n-2)$

Find $y(n) = x_1(n) * x_2(n)$ using

① Linear Convolution

② Inverse Z-transform

Solution:-

① $n_{start} = n_{x1_{st.}} + n_{x2_{st.}} = 0 + 2 = 2$

$n_{end} = n_{x1_{end}} + n_{x2_{end}} = 2 + 2 = 4$

$n=2 \Rightarrow y(2) = \sum_{k=0}^2 x_1(k) x_2(n-k)$

$= x_1(0) x_2(2) + x_1(1) x_2(1) + x_1(2) x_2(0) = 3 \times 5 = 15$

$n=3 \Rightarrow y(3) = \sum_{k=0}^2 x_1(k) x_2(n-k)$

$= x_1(0) x_2(3) + x_1(1) x_2(2) + x_1(2) x_2(1) = 0$

$n=4 \Rightarrow y(4) = \sum_{k=0}^2 x_1(k) x_2(n-k)$

$= x_1(0) x_2(4) + x_1(1) x_2(3) + x_1(2) x_2(2) = 3 \times 2 = 6$

$y(n) = \{0, 0, 15, 0, 6\}$

② $ZT[y(n)] = Y(z) = X_1(z) \cdot X_2(z)$

$X_1(z) = 5 - z^{-2}$

$X_2(z) = 3z^{-2}$

$X_1(z) \cdot X_2(z) = 15z^{-2} - 6z^{-4}$

$y(n) = Z^{-1}[Y(z)] = 15\delta(n-2) - 6\delta(n-4)$

$= \{0, 0, 15, 0, 6\}$

①